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Published in:

Building Continents of Knowledge in Oceans of Data: The Future of Co-Created eHealth

DOI (link to publication from Publisher):

[10.3233/978-1-61499-852-5-496](https://doi.org/10.3233/978-1-61499-852-5-496)

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Publication date:

2018

Document Version

Publisher's PDF, also known as Version of record

[Link to publication from Aalborg University](#)

Citation for published version (APA):

Kanstrup, A. M., Bertelsen, P. S., Nunez, H. C., Jonasen, T. S., & Stage, J. (2018). MOVE: A Mobile App Designed for Social Health Relations in Residential Areas. In G. O. Klein, D. Karlsson, A. Moen, & A. Ugon (Eds.), *Building Continents of Knowledge in Oceans of Data: The Future of Co-Created eHealth* (Vol. 247, pp. 496-500). IOS Press. Studies in Health Technology and Informatics <https://doi.org/10.3233/978-1-61499-852-5-496>

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MOVE: A Mobile App Designed for Social Health Relations in Residential Areas

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Abstract. This paper describes the design of MOVE, a mobile app to support people in forming social relations around exercise in residential areas. MOVE was developed in collaboration with residents and health professionals in a neighbourhood identified as a high-risk health area. The app is targeted to those who are motivated but challenged to do exercise and based on a conceptual model to provide users a social horizon of exercise activities in their residential area. We present the design and first evaluation of MOVE, including usability evaluations in controlled and natural settings. Results from these evaluations indicate that MOVE is a promising platform to support local social health relations once the identified usability problems are resolved.

Keywords. Health promotion, physical activity, mobile health, usability.

1. Introduction

Physical inactivity is identified as the fourth leading risk factor of mortality worldwide [1]. The World Health Organization (WHO) recommends that adults aged 18–64 years do at least 150 minutes of moderate-intensive aerobic physical activity throughout the week or an equivalent combination of moderate activity [2]. These guidelines are difficult to meet for people with health and life challenges and have resulted in a significant interest and investment in health promotion programs. At the same time, the market for consumer technology designed to support physical activity is expanding with the rapid growth of mobile health (mHealth) and wearables [3]. The number of smartphone users worldwide is estimated to reach 2.53 billion in 2018 [4], and a review from 2015 of 165,000 consumer health applications (apps) available via the Apple App Store or Google Play Store shows that two-thirds of mHealth apps focus on everyday health promotion including physical activity, diet, stress and lifestyle [5]. However, research and development of these apps is predominantly centred on people with a high health literacy, and therefore already engaged in exercise activities, while those who are inactive and/or health challenged receive little attention and have a limited voice in technology design [6]. Also, it is remarkable how most fitness apps are designed for individual use and performance monitoring (self-tracking), while research on people's

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physical activity has identified social support as a key factor for physical activity; people with low social support from family, friends, school, workplace and so forth are more than twice as likely to be inactive compared to people with high social support [7]. Thus, research on how social relations can be enhanced and supported by mobile apps to reach inactive and vulnerable users is relevant for the design of future health-promoting technology.

This paper describes the design of MOVE, a mobile app to support people in forming social relations around exercise in residential areas. The goal is to facilitate capacity building on health in local communities. MOVE was developed by the first two authors through an iterative process of participatory design with residents and healthcare professionals living and working in a neighbourhood identified as a high-risk health zone by the Danish Health Authorities (i.e., the percentage of citizens who are obese, inactive, smoke and suffer from mental and chronic illness is high compared to the national level) [6; 8]. The remaining parts of this paper present the concept, functionality and main user interfaces of the MOVE app and results from usability evaluations of the first beta version of MOVE conducted by all authors.

2. MOVE – the conceptual model, beta functionality and user interface

The MOVE app is based on a conceptual model to provide users a social horizon of exercise activities in their residential areas. Users create a profile in the app and enter their name, e-mail, password and the postal code of their preferred residential area(s) (i.e., the area(s) where they wish to follow and participate in exercise activities). Since some users prefer to follow and participate in activities in more than one area, it is possible to add several postal codes. Additionally, filtering allows users to narrow down the exercise activities that they are interested in following (e.g., dance, ball games, fitness, biking, yoga). Also, the profile has a voluntary opportunity to add a date of birth. When a profile is created, the app's entry screen shows a list of activities based on the user's chosen residential area(s) and exercise interests; Figure 1 left shows a list with two activities. At the top of the screen, users can navigate between all activities in the area(s) and the personal list of activities that the user has signed up for (Figure 1a). Users browse the list of activities (i.e., the social horizon of exercise activities in the neighbourhood(s)), by scrolling up and down. For each activity, the user can choose to sign up for, show interest in or like an activity (Figure 1b). When a user wants to participate in an activity, (s)he taps the 'participate' button. Then this user's profile photo is added to the activity, making it visible to others, and the screen shows the total number of participants in the activity. If the user taps the participants' photos, a new screen opens with a detailed list of participants' profile photos and names.

At the bottom of the app screen, the user can navigate between core functionalities such as 'activities', 'groups', 'notifications' and 'profile' (Figure 1c). 'Groups' takes the user to a list of 'my groups' (Figure 1d) and a list of public groups in the user's residential area and within the user's chosen exercise categories (Figure 1e). Users can register for membership in existing groups and create their own groups and invite and manage members. Groups can be either public or private. When the user presses the notification (bell) icon, s(he) sees a list of received notifications. When the user presses the profile icon, s(he) can see and edit profile settings.

In the upper right corner of the entry screen, the user can press a plus symbol to create an activity (Figure 1f). Activities are created within chosen types of exercise

(Figure 1g) and within a specific residential area (Figure 1h). Users create a name for the activity (Figure 1i), type in the meeting location (Figure 1j), select a starting time and expected duration (e.g., two hours) and identify if the activity is public or by invitation only (Figure 1k). Users also may choose to enter a description for the activity.

When users have signed up for activities, they receive notifications 30 minutes before the activities begin and if the activities are cancelled or changed. Figure 1l shows an example of a notification saying, ‘walk the dog – the activity “walk the dog” starts in 30 minutes’.

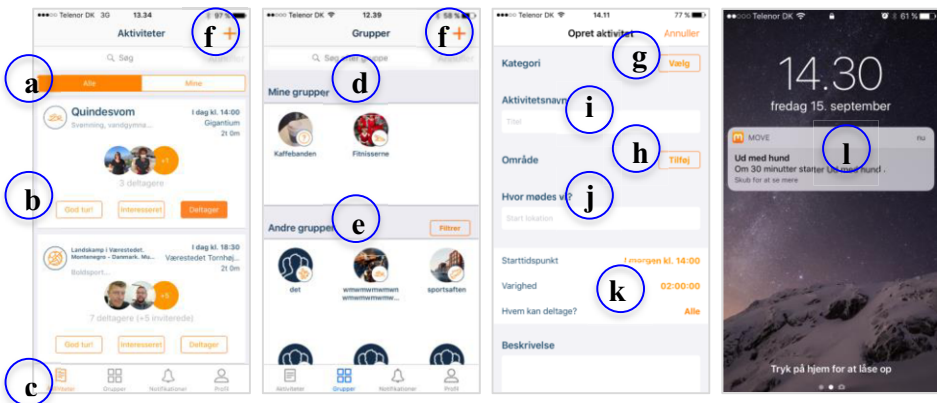


Figure 1. The MOVE app’s main functionality and user interfaces. From left: (1) users can browse and join exercise activities in their chosen residential area(s), (2) users can create and join public and private exercise groups, (3) users can create public and private exercise activities and invite other users to these activities, (4) users receive notifications before planned activities and in cases of activity cancellations or changes.

In addition to the main functionality and user interfaces presented above, the app has a series of screens in a deeper hierarchy where users can find details about activities, groups and other users of the app. A series of pop-ups are designed for feedback and for managing groups and activities, inviting participants, filtering and more. MOVE is available for iOS and Android.

3. Usability evaluation

3.1. Methods and participants

The evaluation of the beta version of MOVE included usability tests in controlled lab settings and in natural environments [9]. A total of 117 users participated in the usability tests. Table 1 summarizes the types of tests and number of participants. Participants were recruited to represent a broad sample of the general adult population and included men and women in ages 21–60. Participants were university students, adults in various types of employment, unemployed and retired citizens. The participants also represented various physical activity levels, varying from self-reported 0–6 hours of exercise per week. All participants had smartphones and installed the beta version of the MOVE app from the App Store or Google Play Store on their own mobile phones as part of the test. All participants were asked about their experience with exercise and mHealth. Some of the participants were familiar with mobile health

apps, while others were novices and had only general knowledge of apps. None of the participants had prior experience with MOVE before participating in the test.

Table 1. Methods and participants in the usability evaluation of the MOVE app.

Test type	Number of participants	Age
Usability test in a controlled setting	95	21-60
Usability test in natural settings	22	35-58 years

The controlled usability tests were carried out with individual users at Aalborg University or in the user’s private home, depending on their preferences. These tests followed a standard procedure for usability testing including a 30-minute task-based think-aloud test and a questionnaire focused on the user experience [9; 10]. The field test aimed to provide insight into the use of MOVE in the users’ natural settings. This test was set up as (a) a four-week field test with a football team consisting of 20 male participants in the neighbourhood where the app was developed and (b) a six-week field test with two men referring to themselves as fitness buddies who lived in another neighbourhood (a non-high-risk health zone). Each field test was concluded with interviews based on the same manual as the one used in the lab test but expanded with questions about long-term engagement from using the app.

3.2. Results

Overall, the participants described the beta version of the MOVE app as easy to navigate. The football team especially considered the app to be useful for coordinating activities and continued using the beta version after the field test had ended. Positive findings rated with high value from the usability evaluations consisted of the *easy navigation* and *transparency* provided by the app. When developing the app, we were unsure about the need for filtering since it places demands on users in the form of extra clicks when creating an activity. The evaluations showed positive ratings for the *filtering*. Several users stated that filtering makes the app a valuable alternative to social media, like Facebook, where they experienced a tendency to ‘get lost in information’. Also, *notifications* were rated with a high value. However, the usability evaluation also identified some problems. Table 2 presents a summary of identified usability issues that users experienced as difficult in the interaction with the app.

Table 2. Identified usability problems

Problem type	Description
Labels	Novice users struggled to understand several of the labels for example the difference between ‘activities’, ‘interests’ and ‘categories’. Field testers were confused about the button for liking an activity (Figure 1b) and searched for a way to send cancellations to activities. All participants were able to finish tasks but called for clearer language about the app’s functionality.
Local navigation	Several users in the usability tests missed buttons for signing up for groups, accepting invitations and editing their profiles. These buttons are placed in the upper right corner of the screen and, especially in the Android app, the text is very small. Half of the users were confused about why they needed to navigate to their profile to filter their interests and log out of the app. In general, the division between the main window and detailed windows was unclear to novice users who went back and forth to create new profiles and activities and to get notifications. Novice users called for more feedback, while experienced users deemed most pop-ups unnecessary.
Layout	The ‘create user’ button that users must press to enter the profile settings the first time they sign up for the app was missed by almost all users. The icon for selecting postal codes (a red cross) confused half of the test users, who suggested a check mark.
Search	No users had success with the search function; they requested a letter-sensitive search. As the number of user profiles in the app increased with the number of usability tests,

	it became clear that the search and filtering functions are important.
Errors	Several technical errors were identified during the tests. Lists of 'other groups' are not filtered by postal code. Some users received notification warnings but were not able to read the notifications.
Additional functionalities	Field testers called for automatic invite and notification each time there was a new activity in the group. Also, the usability field tests showed that activities in groups are often repeated, and for this reason, these test users called for a default postal code and the capability to create a sequence of activities for groups.

In summary, the positive test results (especially the continued use of the app by the field testers) indicate that MOVE provides a promising platform for mediating social relations around exercise. However, since the app is targeted to a broad user group, the identified usability problems will be addressed before releasing the app for free download. Users who experienced difficulties used twice as many clicks to finish tasks in the tests compared to users who could easily decode the interaction (101 clicks vs. 52 clicks). Novice users especially struggled with understanding the basic concepts and functionality. In these tests, it was clear that MOVE represents a new domain for mobile health promotion without established concepts for users to draw on. Consequently, a user guideline needs to be developed to communicate the conceptual model to new users of the app in parallel with an implementation strategy for how to mobilise people to form social relations around exercise in their residential areas. The next step in this research on technology-supported capacity building on health is a large-scale implementation and evaluation of the revised MOVE app in a series of health interventions in selected residential areas in Denmark.

Acknowledgements

TrygFonden supports the research and development of the MOVE app.

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